COLLAPSIBLE STORAGE BOX

BACKGROUND OF THE INVENTION

The subject invention relates to organizing structures for the truck beds of pick-up trucks. More particularly this invention is directed to a collapsible box that usually can be fastened to an upstanding wall of a pick-up truck bed. Most truck bed organizing structures, called truck boxes, tend to be large monolithic structures made of welded aluminum or injection molded structural foam. One problem with such boxes is that they tend to block much of the storage space in the truck bed by occupying usually the front two or three feet of the truck bed volume. Some truck boxes mitigate this blocking phenomenon by providing a so-called "cross bed" construction. A cross bed box is shallow so that it bridges across the truck bed since it is supported on either end by a protruding flange that rests on the upwardly facing surface of the sides of the truck bed. In this way the space beneath the cross bed box is freed for plywood sheets or other long, flat items. Such cross bed boxes are consequently quite shallow, even when they are built to project a substantial distance above the sides of the truck. Truck bed boxes tend to be quite heavy since they must structurally span the full width of the truck bed to keep the space below the box unrestricted.

Accordingly, it is an object of the subject invention to provide a truck box that permits a full depth box to collapse into a narrow compact stack against one wall of the truck bed, preferably the wall between the truck bed and the cab. It is another object of the invention to provide a truck box with bottom side walls and a lid that provides reasonable security and protection for the goods within the box, yet the box includes walls with hinged edges and surfaces that permit the truck box to selectively collapse into a narrow space within the truck bed.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of the collapsible storage box in the collapsed position and positioned against the front end of a pick-up bed.

Figure 2 is a perspective view of the lid of the collapsible storage box being lifted (pivoted) up to allow erection of the box from the collapsed condition.

Figure 3 is another view of the lid being pivoted.

Figure 4 shows the main compartment of the collapsible storage box being opened during erection.

Figure 5 shows the floor of the collapsible storage box being moved into place for assembly forming a space for storage.

Figure 6 shows the collapsible storage box fully erected with the lid open.

Figure 7 shows a golf bag being placed in the storage formed by the fully erected storage box.

Figure 8 shows the fully erected storage box with the lid in the closed position.

Figure 9 is a section taken along line 9-9 of Figure 8.

Figure 10 is a section taken along line 10-10 of Figure 1.

Figure 11 is an alternative embodiment showing the box executed in patterned aluminum sheet.

Figure 12 is another view of the second embodiment.

Figure 13 shows the way the side walls fold in the second embodiment.

Figure 14 shows the side walls and bottom wall in the erected second embodiment.

Figure 15 shows the side walls, lid, front and back walls in the erected second embodiment.

Figure 16 shows the hinged lip on the lid of the second embodiment.

Figure 17 shows positioning the bracket on the truck bed wall.

Figure 18 shows a pair of brackets positioned on the back wall of the truck bed ready to receive the collapsible truck bed box.

Figure 19 shows the bracket positioned on the back wall of the truck box.

Figure 20 shows the truck box and brackets, as they would appear installed in the truck bed.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The instant invention pertains to a collapsible storage box **1** in general, and particularly to a collapsible storage box suitable for use in a pick-up truck bed. While the description below focuses on the specific use of the box in a pick-up truck bed, it is contemplated that it could be used also in other settings, such as in a garage, car trunk, basement, and for general storage in virtually any location.

The first embodiment of the erected box **1**, as shown in Figures 3, 4, 5, 6, 7 and 8 includes a front wall **310**, a rear wall **420**, opposing end walls **410**, a bottom wall **500** and a lid **300**. Each of the walls is made of a lightweight, rigid material, such as plastic, metal or wood. It is important for the material to be resistant to the weather elements, and maintain operability (not be detrimentally affected by UV, salt, etc.) in extreme outdoor use conditions. For the purposes of this description, the uncollapsed or erected box is oriented so that the bottom wall **500** preferably rests directly or indirectly horizontally on the truck bed support surface, the front, rear, and end walls **310, 420** and **410** extend substantially vertically from the bottom wall **500**, and the lid **300** rests horizontally on the top edges **900, 910** and **515** of the front, rear and end walls **310, 420** and **410**.

The front wall **310** is pivotally attached along a pivot line **507** at either end to a front edge

of a respective end wall **410**. Each of the ends of the front wall **310** defines a rearwardly-extending flange **505** (see Figures 5 and 6) to space the pivot line **507** rearwardly from the back surface of the front wall **310**. The flange **505** allows enough space between the pivot line **507** and the back surface of the front wall **310** to allow the bottom wall **500** to lay against the front wall **310** without interfering with the folding of the end walls **410** when the box is collapsed into its compact condition, as described below. The bottom edge **508** of the front wall **310** is pivotally attached to the front edge **512** of the bottom wall **500**. Alternatively the bottom wall **500** could be pivotally attached to the bottom edge **600** of the rear wall **420**. The lock mechanism can alternatively be located on the lid **300** so as to interact with a mating lock mechanism on the end wall(s) **410**. The front wall **310** includes part of a lock mechanism which, when engaged with the mating lock mechanism **200** on the front hinged lip **302** of the lid **300**, allows the lid **300** to be locked closed if desired.

The rear wall **420** is also pivotally attached at or near either end to the rear edge of a respective end wall **410**. The lid **300** is pivotally attached along a rear edge to the top edge **910** of the rear wall **420**. The top edge **910** of the rear wall **420** can define a horizontal plane, flange or rim **320**, with the hinge **205** being located at the front of the horizontal plane, flange or rim **320** (See Figures 2, 6 and 7). The rear wall **420** in the instant invention is positioned adjacent to and in possible contact with the front wall of the pick-up bed **100**. The rear wall **420** can be permanently fixed to the front wall of the pick-up bed **100** by adhesives, through-bolts, or other such types of fasteners such as shown in Figure 8. The rear wall **420** can also be removably fixed to the front wall of the pick-up bed **100**, such as by a hook and loop type fastener (such as with hook and loop type fastener systems) or other removable fasteners. This would allow the box to be securely positioned in the truck bed, or removed, as desired by the user.

The end walls **410** each define a vertically extending pivot line, defined in the preferred embodiment by a hinge **415** such as a piano hinge, located halfway along their length from front to back. The pivot line splits each end wall **410** into a front section **411** and a rear section **412**, and allows the front **411** and rear **412** sections to pivot to a position where they are side-by-side (See Figure 4). The hinge **415** is oriented on the pivot line to cause the end walls **410** to pivot inwardly into the interior of the box when collapsing the box

from the erect condition.

The lid **300** includes a main body and a front lip **302** pivotally attached along a pivot line **305** to the main body. The front lip **302** bends from right angles to the main body (see Figures 4, 5, 6, and 7) to extending in-line (substantially in a common plane with) with the lid main body **300** (see Figures 1 and 2). A locking structure **200** is positioned midway along the length of the lip **302**. The locking structure **200** works in conjunction with a first mating locking structure **314** on the top edge **900** of the front wall **310** to selectively lock the lid **300** when the box is in the erected condition. As mentioned before, the lock could be positioned elsewhere, and could also be made to work when the box is in the collapsed position. This is accomplished by providing a second mating lock structure **315**, for example near the bottom edge **508** of the front wall **310** as shown in Figure 3. The locking structure **200** on the pivoting lip **302** aligns with this second mating lock structure **315** when the box is in its collapsed or stored position as shown in Figure 1, for example.

In operation, the box is easily converted from the collapsed condition to the assembled condition. In the collapsed position and the assembled position the back wall **420** remains in relatively the same position. The other walls pivot and move with respect to the back wall **420** between the collapsed and assembled position.

In the collapsed position (see Figure 1), the bottom wall **500** is folded upwardly along its pivot line with the front wall **310** to lay against the rear side of the front wall **310** (see Figure 4). The combination of the front and bottom walls **310** and **500** lay adjacent to but not in contact with the front surface of the rear wall **420**. The combination of the front wall **310** and bottom wall **500** is able to be in such a position because the end walls **410** each bend inwardly along their respective center pivot lines (see Figure 3). As mentioned above, the flange **505** on either end of the front wall **310** spaces the pivot line **507** between the front wall **310** and each end wall **410** rearwardly to allow for the folded position of the bottom wall **500** against the front wall **310** without interfering with the end walls **410**. Because each end wall **410** is folded, the front portion **411** and rear portion **412** of each lay against each other.

As referenced earlier, the bottom wall **500** could also pivotably attach to the bottom edge **600** of the rear wall **420**. However, pivotally attaching the bottom wall **500** to the bottom edge **508** of the front wall **310** adds L-beam structure to the front wall **310**, and also allows the user to more easily use one hand to collapse the front panel while keeping the bottom wall **500** from undesirably falling down.

In the collapsed position, the front wall **310**, bottom wall **500**, and folded end walls **410** are all stacked against the front surface of the rear wall **420**. In this position these parts are under the rim **320** formed along the top edge **910** of the rear wall **420**. The rim **320** is dimensioned to receive these folded parts underneath it. The lid **300** then folds downwardly over the other parts to encase them between the rear wall **420**, rim **320** and lid **300**. The lid **300** defines flanges extending downwardly **308** from the side edges to somewhat envelope the folded parts when in the collapsed position. When folded down in the collapsed position, the lip **302** on the lid **300** extends in a common plane with the lid **300** and helps cover the bottom edge **508** of the front wall **310**. The lip **302** also adds L-beam structure to stiffen the lid **300** in the uncollapsed or horizontal position. A second mating lock structure **315**, like that used to engage the lock or locks on the lid **300** when the box is erected, could be provided at or near the bottom edge **508** of the front wall **310**, so that the lip **302** on the lid **300** could be secured to hold the box in the collapsed position.

To convert the collapsed truck box to the assembled truck box, the lid **300**, after unlocking the lock **200** from the second mating lock structure **315**, if provided, is pivoted upwardly out of the way, as shown in Figures 2 and 3.The front wall **310** and bottom wall **500**, still in their stacked configuration, are moved away from the rear wall **420**, as shown in Figure 4. This causes the end walls **410** each to unfold along their pivot lines into substantially straight walls. See Figures 5 and 6. The bottom wall **500** is then pivoted away from the front wall **310** and into its horizontal position. In its horizontal position, the bottom wall **500** mechanically interferes with and blocks the inward bending of the end walls **410** about their pivot lines, thus keeping the box from accidentally collapsing. See Figure 5. If the bottom wall **500** is pivotally attached to the rear wall **420** then these steps would be slightly altered accordingly.

The truck box is now in its assembled position and ready to receive any articles that fit into the recess **700** formed by the walls. The lid **300** closes over the top of the open box, and contacts the top edges **900** and **515** of the front wall **310** and both end walls **410** to help keep out dirt and weather. The pivotal lip **302** can now be turned down to embrace the top, front surface of the front wall **310**, and the lock **200** can be actuated to keep the lid **300** closed and secure the articles placed in the box.

As shown, the instant invention can be utilized as a carrier inside of a pick-up bed **105**. The truck box can be positioned against, and preferably affixed to, the front wall of the pick-up bed **100**, and when in the collapsed position it takes up approximately 3-4 inches of space. When in the open position, the box extends rearwardly to about the front end of the wheel wells **108** inside the truck bed (depending on the size of the truck bed **105** and the truck box). A wheel, (not shown) could be provided near the juncture of the front wall **310** and each of the side walls **410** to help support the front wall **310** when it is moved between its collapsed and expanded positions. Such wheels could also help the box ride over the initial sloping surfaces of the protruding wheel wells **108** at the corners of the erected truck box.

Each of the walls is approximately 1/4 to 1/2 inch in thickness if made of injection molded polymers or the like. The overall depth and width of the truck box is generally dictated by the height of the back wall **420** of the truck box. The truck box is generally as tall as the front wall of the truck bed **100**. Depth is defined as the distance from the closed lid **300** to the bottom wall **500**. Width is defined as the distance from the front wall **310** to the back wall **420**. Length is defined as the distance between the end walls **410**. Assuming that the lid **300** needs to cover the width of the truck box in the assembled condition, and the lid **300** needs to extend generally vertically when in the collapsed position, the width and height of the truck box is dictated by the height of the back wall **420**. If these two assumptions are not required, then the truck box can be virtually any size when in the assembled condition and still collapse to a significantly smaller size when not in use.

Figure 9 is a section view through the truck box when in the assembled condition. Figure 10 is a section view through the truck box when in the collapsed condition.

The truck box can include other features and still function in the intended manner. For instance, the bottom wall **500** could be attached along its rear edge to the bottom edge **600** of the rear wall **420**. Further, the rear wall **420** could be a little taller than the front wall **310**, with the top edges **515** of the end walls **410** tapered to allow the lid **300** to slant downwardly and drain any liquid toward the front wall **310**. To further enhance the weatherproof capabilities, the edges that mate when in the assembled condition, as well as the hinges, can be sealed by some manner such as by weather stripping or other such suitable treatment.

Since the truck box can be attached to the front or side walls of the truck bed **105**, it can be elevated a couple of inches above the truck bed **105** to allow for storing things, such as long 2x4s, under the truck box. Further, the instant invention is believed to be the only such truck box with at least a floor **500**, front wall **310** and a lid **300** that does not require fastening to the floor of the truck bed **105**.

All pivot lines can be defined by piano hinges (continuous), or can be discrete hinges, living hinges, or any type of connection that allows the relative pivoting motion of two planar members with respect to one another. The piano hinge structure is preferred because it provides some structural rigidity to the storage box when in the assembled condition.

The instant invention has many advantages. There are no obtrusions on the floor of the truck box **105**. The truck box folds to a collapsed position when desired by the user, and is in a vertical orientation when collapsed to avoid collecting water when not in use.

Alternatively, the end walls **410** of the instant invention could be eliminated so the side walls of the truck box could be used to keep objects in the truck box when in the erected position. In this embodiment, at least one hinged link (brace) would need to be positioned to connect the front and rear walls **310** and **420**. Since it is hinged it would allow the front and rear walls **310** and **420** to collapse together. Likewise, the floor panel could be removed to use the bottom of the truck bed **105** if desired.

Figures 11, etc. show an alternative embodiment of the invention **1A**. Here, rather than using injection molded plastic or the like to construct the various walls, panels and hinges, these are made from metal, preferably from the common aluminum sheet used for similar truck boxes having fixed and thus non-expandable shapes. The structures and functions are essentially identical with that shown in the first embodiment. Figure 13 shows a side wall **410A** of the second embodiment in a partially expanded or collapsed position. The front wall **310A** includes a flange **1300** that embraces the upper edge of the bottom wall **500A**, which is contained within the flange **1300** and the side flange in this partially collapsed position. These and other flanges are formed using a conventional metal brake, although die stamping could be used to form the flanges along the edges and other structurally enhancing ribs and the like in the major faces of the panels thus shaped. The side wall **410A** has a vertical flange **1305** carried by one of the mutually hinged portions **415A** of the side wall **410A**. This vertical flange **1305** helps stabilize the side wall **410A** in its fully erect position. Thus, the user's goods stored within the box **1A** will not tend to bow the side wall **410A** out thanks to this vertical flange **1305** which back stops the piano hinge positioned on the outside thereof. Figure 14 shows the bottom wall **500A** now in its deployed position within the fully erected box. Note that this bottom wall **500A** has flanges **1400** around each side edge and along the edge furthest away from the side edge opposite its edge hinged to the front wall **310A**. Figure 15 shows the lid **300A** of this embodiment with the pivotal lip **302A** in its opened position. Ideally the hinge **1500** connecting the pivotal lip **302A** with the rest of the lid **300A** is integrally formed with the sheet metal. In Figure 16 the pivotal lip **302A** is in its closed position where the lock structure can engage the first mating lock mechanism (not shown) in a manner similar to that shown with regard to the first embodiment. This pivotal lip **302A** is preferably executed in a distinctive color or pattern so that the box can be customized or carry unique branding logos or trademarks.

As mentioned before, attaching the collapsible box structure to the side (in this case the front wall) of the truck box is an important step. Here a U-shaped bracket **1700** engages the front and back surface of that truck box wall and spans the lip connecting therebetween. Figure 18 shows these brackets **1700** positioned. Each bracket **1700** preferably has a large setscrew, which can be tightened towards the truck bed wall 100 to engage below its lip, thus holding the bracket **1700** in place on the bed wall **100** and thus

holding the box in the truck bed. The bracket **1700** also has protruding bolts **905**, which engage corresponding holes in the back wall **420** of the truck box. These brackets **1700** can be first positioned at an appropriate location along the truck bed wall. Then the truck box itself can be partially expanded so that nuts matching the protruding bolts **905** can be fastened once the bolts **905** are passed through appropriately provided holes through the box's back wall **420**. Alternatively the brackets **1700** can be pre-positioned on the back wall **420** of the truck box as shown in Figure 19. The resulting collapsible truck box is fastened to the truck bed by the front wall **100** as shown in Figure 20.

As mentioned previously, this bracket mounting system permits a properly rugged box to be suspended above the bottom wall **500** of the truck box. In this way construction materials or lumber as represented by the element shown can pass below the bottom wall **500** of even the fully expanded and erected truck box, giving extra versatility so that the truck box can expand over and can remain expanded or erected even though long elements being carried in the truck bed **105** extend into thus occupied space. As mentioned before wheels may be provided near the juncture between the front wall **310** and the side walls **410** to further support and aid in moving the truck box from its collapsed to its fully erect position.

While the invention has been particularly shown and described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that various other changes in the form and details may be made without departing from the spirit and scope of the invention.